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J1033 U.S. PTO 60/438048

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
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☐ *Additional inventors are being named on the ______ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

Flexible Vehicle Guiding Element

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS *(check all that apply)*

[X] Specification *Number of Pages* 9 ☐ CD(s), Number

[X] Drawing(s) *Number of Sheets* 4 ☐ Other (specify)

☐ Application Data Sheet. See 37 CFR 1.76

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Respectfully submitted,

SIGNATURE [signature] Date 12/30/2003

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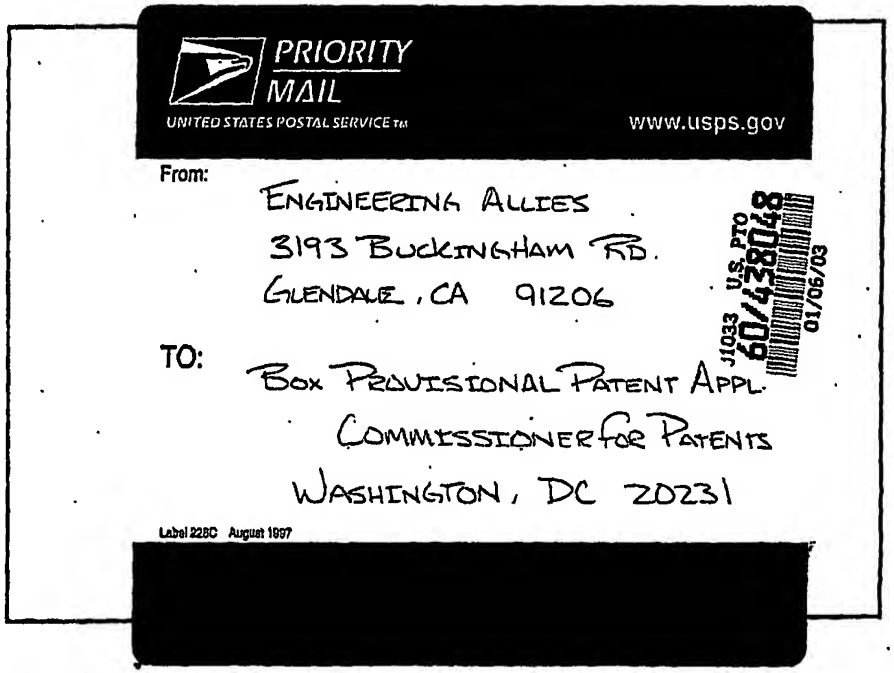

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SPECIFICATION

[Electronic Version 1.2.8]

Flexible Vehicle Guiding Element

Background of Invention

[0001] Field of Invention- this invention presently relates to the field of children's toys in the area of non-electrified railroad tracks and track systems (hereinafter referred to as "Vehicle Guiding Systems" or "VGS"). VGS typically consist of a variety of "Vehicle Guiding Elements" (hereinafter referred to as "VGE"). It is conceivable that this invention could also relate to electrified or otherwise powered VGS.

[0002] Prior Art- at the present time, common and/or typical VGS are made from solid wood VGE that are not flexible. These non-flexible, or "Rigid VGE"(hereinafter referred to as "RVGE"), are made in different shapes to perform different specialized functions. There are straight sections of various lengths, there are curved sections with variations on the turning radius and the number of degrees of turn, as well, there are hill sections that go up, go down, and hill sections that go up and down. With all the different types of RVGE, there are engineering solutions that are unavailable because of the rigidity. One of the problems is that it can be difficult to connect the elements to each other to make a complete circuit or a complete track-i.e. it is often difficult to make the ends line up. As a result, the user must spend time to reconfigure the elements until the ends line up properly and fit together. Also, the hill sections create a vertical rise of a predetermined amount thus making it impossible to vary the exact amount of the rise. These problems serve to frustrate the user by limiting the number of configurations that are possible and thereby limiting the user's creativity.

[0003] This invention builds on all known similar products and significantly improves the conceptual application of such products. Using the invention significantly expands the level of use for existing products and allows for educational opportunities not available with former inventions, in that the devices are user formed into one of many shapes along any of the three axis (x,y or z). During testing a new standard was developed and connections on this invention withstood a B-6 force for over two hours without a hint of failure. (Note; B= boy and the numeric value is the number of boys age 2-10 playing with multiple FVGS at one time in one setting.)

Summary of Invention

[0004] There are two primary objectives of this invention at its present stage of development. The first primary objective is to create a "Flexible VGS" (hereinafter referred to as FVGS) that enables a user to manually bend/form/adapt the element(s) of the FVGS to a variety of shapes and configurations. The second primary objective is to create an FVGS such that when the element(s) of the FVGS are connected to one or more RVGS sections, the two types of guidance systems combine to create a seamless whole.

[0005] In the first primary objective, the FVGS can consist of a single "Universal FVGE" (hereinafter referred to as Universal-FVGE) that can be used singly or in multiples to create a complete course of a desired configuration. The Universal-FVGE would have the capability to bend so as to create either curves, and/or hill configurations either separately or in combination. The Universal-FGVE enables a user to create a complete course using only FVGE sections. Alternately, the FVGS might consist of multiple FVGE where some elements may be more specialized to best achieve a desired function such as Curve, Hill, Tee-Crossing (including over/under crossings), Merges, Switches, etc. Straight sections can be made in various lengths. Curved sections can be made so as to primarily bend in only the horizontal plane. These curved sections could then be shaped to form a curve of desired radius and angle. Also, the curved sections could be shaped into an "S" shape if desired. Similarly, the hill sections can be made to primarily bend in only a vertical plane. The "hills" might be formed from a single section or multiple sections added together where one or more sections climbs and succeeding sections descend. The flexible nature of the hill FVGE, allows any desired amount of rise to be attained and is not limited to any predetermined amount. One other element of the FVGS could also be the Universal-FVGE mentioned earlier. Other specialized elements could be made to accommodate the functions of Tee-Crossings, Mergings, Switches, etc. It is important to note that each FVGE would be designed to withstand the forces expected under normal use and conditions. Please refer to the drawings for further details on these elements.

[0006] The second primary objective is for the FVGE to be compatible with existing RVGS. Specifically, existing RVGS typically have a male end and a female end. To link RVGE sections together, the male end of one section loosely fits into the female end of an adjacent section. The FVGE sections will have a male end that is designed to fit into the female end of an RVGE. Similarly, the female end of any FVGE will readily accept the male end of the RVGE. Furthermore, not only will any RVGS be able to connect to any FVGE, but the connection will be improved as compared to known presently available RVGS sections connected to each other. The improvement is in the exact shape and detail of the male and female ends of the FVGE. The shape allows for easy insertion and ready removal, however, small intentionally molded ridges create a slight friction-fit in the connection that makes the coupling more reliable and makes accidental disassembly less likely. Once an FVGE is incorporated into an RVGS, the flexibility advantages of the

FVGS are obtained. Effectively, by incorporating one or more FVGE sections into an RVGS, the RVGS is transformed into an FVGS with all the advantages that flexibility affords.

Brief Description of Drawings

[0007] The Flexible Vehicle Guiding Element (FVGE) is illustrated in the drawings, wherein:

[0008] Fig. 1: Isometric view of an FVGE. The Figure shows the X, Y and Z axis used in discussing the functions of the FVGE.

[0009] Fig. 2: Illustrates the plan view of a non-flexed FVGE. It shows duplicate relief cuts on each side to allow the FVGE to bend from side to side. It also shows connections that are compatible with common rigid vehicle guiding elements (RVGE), yet have a unique friction fit (created with designed-in ridges in both the female and male ends) to allow connection with other FVGE and common RVGE in a more sure and stable manner.

[0010] Fig. 3: Cross section view of FVGE. This view shows a configuration of the FVGE with an imbedded twisted pair of round ductile elements.

[0011] Fig. 4: Detail view of relief cuts in side of FVGE.

[0012] Fig. 5: Detail view of a portion of the female connection complete with the friction ridges and guiding groove.

[0013] Fig. 6: Plan view of the underside of FVGE. This view illustrates the designed in relief holes and voids.

[0014] Fig. 7: Detail view of female and male connections for the FVGE connected together. Both the female and the male connections have ridges that are offset from each other so as not to interfere with each other when connected to another FVGE.

[0015] Fig. 8: Detail view of the male end of an FVGE connected to the female end of a typical RVGE. Ridges incorporated into the male end of the FVGE create an interference fit against the female end of the RVGE.

[0016] Fig. 9: Detail view of the female end an FVGE connected to the male end of a typical RVGE. Ridges incorporated into the female end of the FVGE create an interference fit against the male end of the RVGE.

[0017] Fig. 10: Isometric view of an FVGE shaped along all three axis.

[0018] Fig. 11: Isometric view of a merge/switch FVGE, one of many forms of special purpose FVGE that may be made available.

[0019] Fig. 12: Cross section view of a concept U profile with an imbedded rectangular ductile metal bar inside the FVGE to primarily allow shaping about the z axis.

[0020] Fig. 13: Cross section view of a concept inverted T profile with an imbedded round ductile metal bar inside the FVGE to allow shaping about the x,y & z axis.

[0021] Fig. 14: Cross section view of a concept I profile with an imbedded square ductile metal bar inside the FVGE to allow shaping about the x, y & z axis.

[0022] Fig. 15: Cross section view of a concept rectangular/square profile with two imbedded square ductile metal bars inside the FVGE to primarily allow shaping about the z axis.

Detailed Description

[0023] **Notes to Figures:** 20 series notes relate to complete elements; 20 relates to track elements that may be either formed, bent or laid straight. 21 relates to existing ridged track elements. 22 relates to flexible merge, tee or cross type track elements. 30 series notes relate to specific features of the elements. 31 relates to triangular indentations that allow bending about the x, y, & z axis. 32 relates to the coupling or mating detail for the female ends of the elements. 33 relates to the groove along which a guided device travels. 34 relates to the coupling or mating detail for the male end of the element. 35 relates to filleted, chamfered, or relieved corners at the edge of each triangular indentation (noted as 31). 36 relates to the round relief cut on the inboard side of the triangular indentations (noted as 31). 37 relates to the under structure of the end zone of each element. 38 relates to voids created by support tooling for the ductile center member (noted as 41). 39 relates to the voids engineered into the bottom surface to allow for bending about the x, y, and z axis while providing for maintenance of similar wall thickness in the molding process. 40 relates to the material of which the element is molded. 41 relates to a twisted pair of round steel rods serving as the ductile member incased within the molded element (noted as 20,22). 42 relates to a rectangular steel strip serving as the ductile member incased within the molded element (noted as 20,22). 43 relates to a single round steel wire serving as the ductile member incased within the molded element (noted as 20,22). 44 relates to a square steel wire serving as the ductile member encased within the molded element (noted as 20,22, 23). 45 relates to a multiple rectangular or square steel wires serving as the ductile member incased within the molded element (noted as 20,22). 46 relates to filleted, chamfered, or relieved corners at each end of the guiding grooves (noted as 33). 47 relates to the

beveled upper insertion and receptor edges of the male and female connectors that allow for ease of assembly.

[0024] A flexible vehicle guiding element (FVGE) in the current configuration/application is shown in Figures 1 and 11and is designed for the purpose of guiding toy trains through all three physical planes x, y and z. The triangular indentations (note as 31) shown in Fig.1 are for the purpose of allowing the bending of the element into curves about the z axis. The bends about the y axis are lower in profile and less demanding than bends about the z axis. In real world situations and in toy train tracks there is less z axis depth, the same is true for this invention and fewer relief cuts are required for bending about the y axis. However, in the manufacturing of the present FVGE, voids (See note 39 on Fig.6.) have been designed into the element to provide for ease in bending about the y axis and to provide more uniform molding of the elements. This invention also allows for bending about the x axis. In use, this is manifested in a twisting of the element about its longitudinal center and allows for "super" to be developed on corners as well as allowing for climbing or descending spirals. The triangular indentations (note 31) and the voids (See note 39 on Fig.6.) work simultaneously to allow for distortion free movement or twisting about the x axis.

[0025] The FVGE are provided, in the current design, with a metal ductile central core that holds the shape set by the user. The current FVGE is utilizing a twisted pair of round wires positioned along the centerline of the x axis (note 41). Each wire of the twisted pair molded into the interior of the FVGE (noted as 41) will experience ductile deformation independently. This system of two wires undergoing independent deformation reduces the cross sectional area needed for retaining shapes as required in use. The ductile bending across the smaller cross sectional area of each wire of the pair reduces the incidence of metal fatigue. The inventor envisions situations where a single or other forms of multiple ductile members would better address the need. The profile of the ductile member may vary in cross section (note as 42,43,44,45, Fig. 12-15).

[0026] The male and female ends of the FVGE are designed to mate effectively and certainly with the corresponding ends of the currently available ridged vehicle guidance element (RVGE) on the market from other makers. The invention advances the general connection design by including small ridges inside the female end (note 32) and on the outside of the male end (note 34) that provide a friction fit. The small ridges pull the sections tightly together in a manner superior to any known brand in the market as of the time of this writing. The male and female connector ends also incorporate beveled upper insertion and receptor edges that allow for ease of connection (note 47 Fig. 5). These bevels allow for rapid centering of the connectors in the mating process. The connectors provided in this track system will hold under movement and adjustment. Therefore the user may spend more time on layout design and less time on repairing

disconnections. Users are not challenged to keep attention so intently on maintaining the connections that they cannot visualize the layout they would like to achieve.

[0027] The connection selected for the initial design is compatible with at least two currently marketed products, however future designs may be non-compatible. This last is especially true in the design of potential and already envisioned industrial applications.

[0028] The current version of the track is made of polyvinyl chloride (PVC) the same material we use to transport drinking water and irrigation water. While not impervious to the sun, this product should last indefinitely under normal indoor and outdoor use. It is understood the material selection is not intended to be limited to PVC or even to plastic.

[0029] As conceived the design may be expanded to non-toy related applications in industrial and construction environments. Therefore the inventor does not limit the application in any manner to guiding toy vehicles. Specifically, it is conceived that the device may be useful as the base for a magnetic drive application with the goal of industrial transport.

[0030] It will be understood that the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

[0031] While the invention has been illustrated and described as embodied in a guiding element for toy vehicles, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Claims

[c1]

A flexible vehicle guiding element (FVGE) which can be easily reshaped by the track designer into varied configurations. comprising:

a) a pliable, elastomeric body, having a connection method on both ends, and a central portion longitudinally extending between the ends.

b) at least one bendable, ductile, self-supporting length of a twisted pair of round cross-sectional core wires embedded and centrally disposed between said ends and oriented as necessary to achieve desired flexibility.

[c2] A FVGE, as claimed in claim 1, wherein the twisted pair of round core wires is replaced with square cross-sectional core wire.

[c3] A FVGE, as claimed in claim 1, wherein the twisted pair of round core wires is replaced with rectangular cross-sectional core wire.

[c4] A FVGE, as claimed in claim 1, wherein there is any combination of a twisted pair of round, square or rectangular core wires.

[c5] A FVGE connection that creates a friction or interference fit between both rigid vehicle guiding elements (RVGE) and other FVGEs. This connection consists of two or more offset ridges or other protrusions that are incorporated into both the female and male connector profiles.

[c6] A FVGE, as claimed in claim 1, wherein the element cross-section incorporates one or two groves used in guiding a wheeled vehicle.

[c7] A FVGE, as claimed in claim 1, wherein the element has a rectangular or square cross-section in which the sides and or bottom and top are used in guiding a vehicle.

[c8] A FVGE, as claimed in claim 1, wherein the FVGE has a T, U or H shaped cross-section in which any combination of surfaces may be used in guiding a vehicle.

[c9] A FVGE, as claimed in claim 1, wherein any variation of length, width and depth my be used.

[c10] A FVGE, as claimed in claim 1, wherein any variation or combination of pliable, flexible, semi-flexible, or semi-rigid material is used to create the main body.

[c11]

A FVGE, as claimed in claim 1, wherein any variation or combination of relief cuts or voids are made on any of the surfaces or internally to facilitate the bending of the element.

[c12]

A FVGE, as claimed in claim 1, wherein any variation of switch or cross track elements is developed.

[c13]

A stretchable guide element, as claimed in claim 1, created by using relief cuts and any combination of ductile core material and flexible base material.

[c14]

A flexible or stretchable guide element, as claimed in claim1, wherein any variation of surface finishes is used.

[c15]

A flexible or stretchable guide element, as claimed in claim1, wherein any variation of color is used.

Abstract of Disclosure

[0032] A flexible vehicle guiding element (FVGE) used to create a path or course for a vehicle to travel along. The illustrated design directly applies to an element used in the guiding of a toy along a pre-constructed course. However the invention envisions the same approach could be applied in industrial and consumer applications. This FVGE is unique in that it has a pliable body allowing the element to be bent horizontally, vertically, or any combination of the two directions including horizontal and vertical spirals. Embedded within the FVGE is a ductile core material that has enough bending resistance to retain the element's form after being bent. The core material remains within the body of the FVGE while the guide element is bent or twisted. The FVGE allows the course designer to construct virtually any route over, under or around an obstacle. This invention in its present configurations relates to children's toys and specifically to non-electrified toy railroad tracks and track systems for guiding vehicles along a defined path. The invention in its current configuration is designed for use by children as well as adults. The user may shape the path of travel for the vehicle of designed use about any of the three x, y and z axis. The device is a bendable guidance element that will hold its shape indefinitely or until reshaped by the user. This invention in its

current configuration, is compatible with the primary US and UK brands of currently marketed wood tracks for small non-electric toy trains. The male and female connecting devices supplied as integral parts of each element of this invention function in a manner believed to be superior to any products currently on the market.

Figures

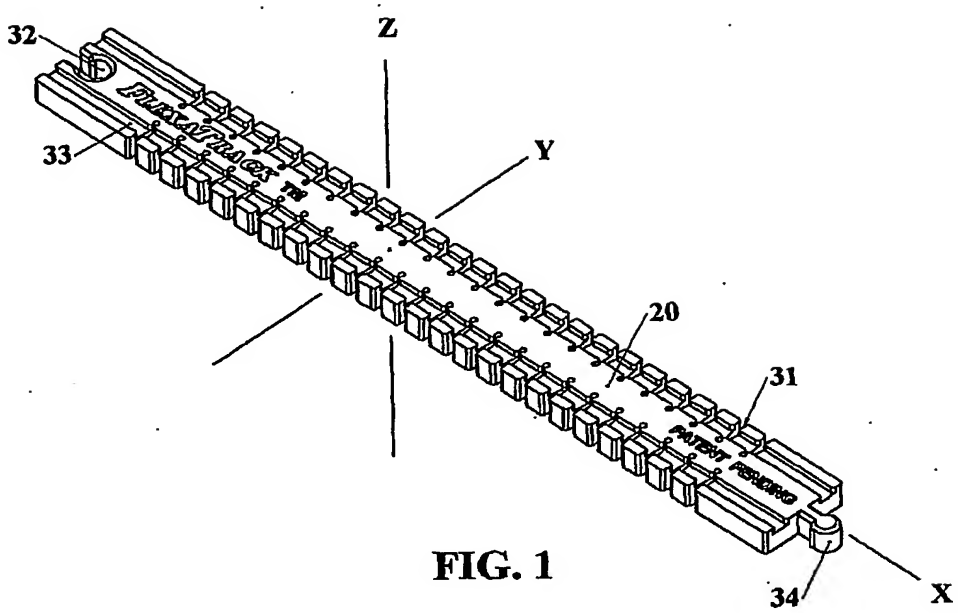

FIG. 1

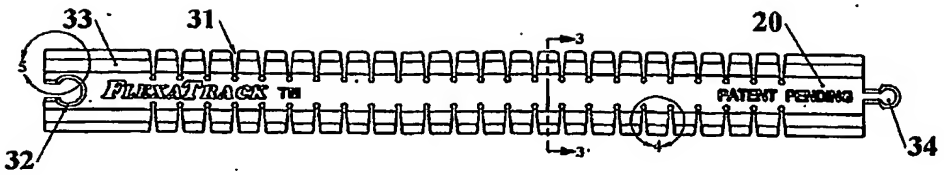

FIG. 2

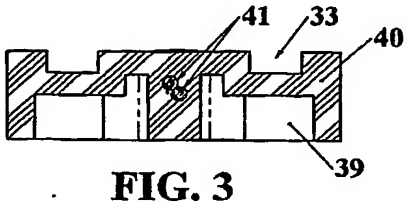

FIG. 3

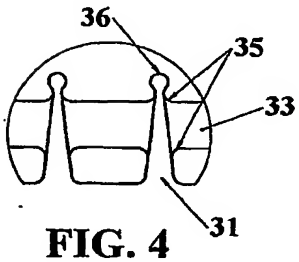

FIG. 4

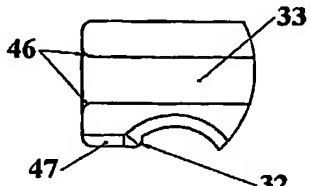

FIG. 5

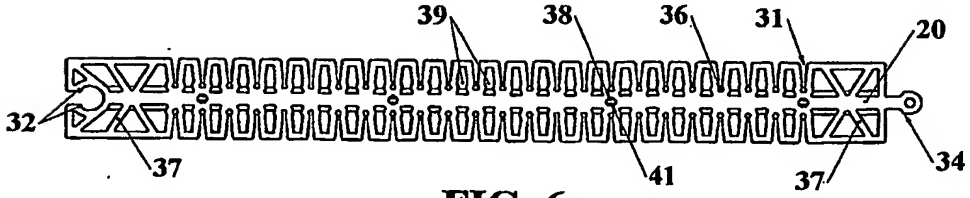

FIG. 6

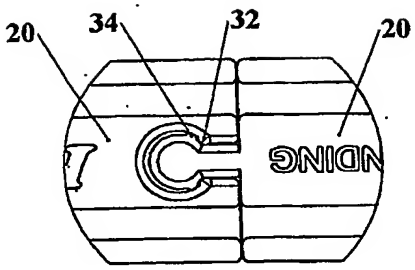

FIG. 7

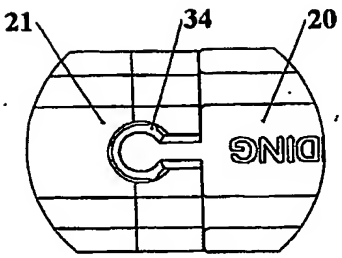

FIG. 8

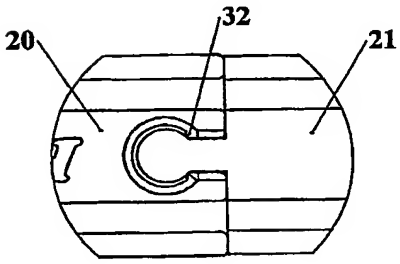

FIG. 9

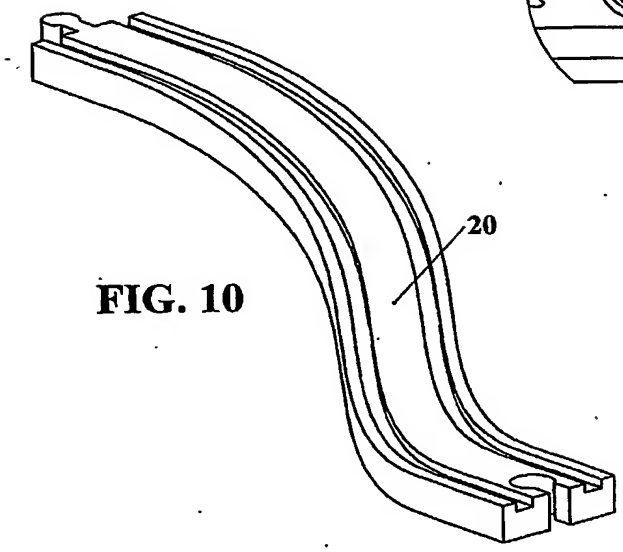

FIG. 10

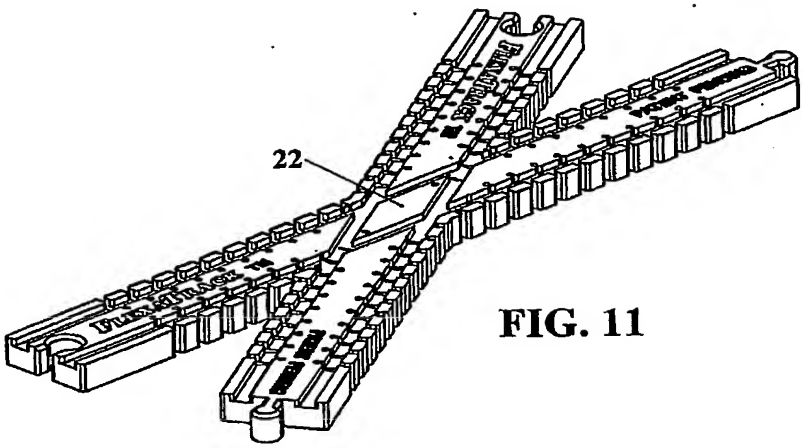

FIG. 11

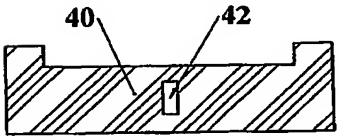

FIG. 12

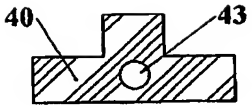

FIG. 13

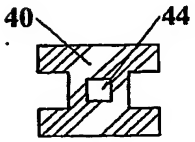

FIG. 14

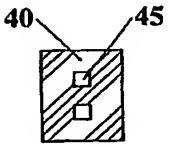

FIG. 15

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